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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/820,294	04/08/2004	Sin-Doo Lee		7463

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EXAMINER	
SCHECHTER, ANDREW M	

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 04/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/820,294	LEE ET AL.	
	Examiner	Art Unit	
	Andrew Schechter	2871	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 January 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) *3,5,10-12 and 20-22* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,4,6-9 and 13-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 April 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/19/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because Figs. 2a and 2b do not show undulations on the top surface, as described in the specification and the claims. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: "Liquid crystal displays with multi-domain effect formed by surface undulations".

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 16 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The phrase "if the surface undulation is one-dimensional" is unclear to the examiner. For examining purposes, the examiner interprets the phrase to mean "when considered along one particular direction of the surface undulation". It might instead be considered a conditional phrase so that the claim does not further limit at all if the undulation is not one-dimensional, or it might be intended as a separate limitation requiring that the undulation be one-dimensional. Clarification by the applicant as to which of these meanings is intended is necessary.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 1, 2, 4, 6, 8, 9, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Kataoka et al.,* U.S. Patent No. 6,362,863.

Kataoka discloses [see Fig. 12, for instance] a liquid crystal display comprising an upper substrate [40] having the inner surface on which an upper electrode [44] and an upper grating film [48 and/or 52] having surface undulation are laminated; a lower substrate [42] having the inner surface on which a lower electrode [46] and a lower grating film [50 and/or 54] having surface undulation are laminated, the said inner surface of the lower substrate being located facing the inner surface of the upper substrate; and the liquid crystal [58] having dielectric anisotropy [col. 6, lines 11-13] is in the space between the upper and lower substrates.

Kataoka does not necessarily disclose that the liquid crystal is "sealed" in the space. The examiner takes official notice that it is well-known to seal liquid crystal between substrates [see class 349, subclass 153 "liquid crystal seal"]; it would have been obvious to one of ordinary skill in the art at the time of the invention to seal the liquid crystal, motivated by the desire to avoid having the liquid crystal leak out of the device. Claim 1 is therefore unpatentable.

Kataoka discloses that the upper grating film is laminated upon the upper electrode, so claim 2 is also unpatentable. The lower grating film is laminated upon the lower electrode, so claim 4 is also unpatentable. The upper and lower undulations are parallel to each other, so the angle between them is either 0° or 180°, so claim 6 is also unpatentable ["between 0° and 180° is assumed by the examiner to be inclusive of 0° and 180°]. At least one of the upper and lower grating films is a vertical alignment film [col. 6, line 9], so claim 8 is also unpatentable. The pretilt angle of the liquid crystal from the direction normal to the upper substrate or the lower substrate having a vertical alignment film is between 0° and 9° [it is 2°, col. 6, lines 35-37], so claim 9 is also unpatentable. *Kataoka* discloses that the surface undulation can be formed using a photo-reactive resin [see Fig. 6], so claim 13 is also unpatentable.

7. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Kataoka et al.,* U.S. Patent No. 6,362,863 as applied above, in view of *Fergason,* U.S. Patent No. 4,693,557 and *Miller,* U.S. Patent No. 6,535,257.

Kataoka discloses that the photo-reactive resin is UV-reactive, but not that the difference between the ordinary refractive index of the liquid crystal and the refractive index of the resin is 2% or less. *Fergason* teaches that optical transmission without scattering is maximized when the ordinary refractive index of the liquid crystal and the refractive index of a containment medium are matched as closely as possible, most preferably equal [col. 21, lines 20-25], for a resin next to the liquid crystal. *Miller* gives the same teaching for spacer material and epoxy in a liquid crystal cell [col. 5, lines 1-17]. It would have been obvious to one of ordinary skill in the art at the time of the

invention to index-match the liquid crystal and the grating film in *Kataoka*, motivated by these teachings that doing so reduces undesired scattering from the interface between them. Claim 14 is therefore unpatentable.

The height of the surface undulation is determined according to the amount of the irradiated UV light, so claim 15 is also unpatentable. [This is disclosed by *Kataoka*, see Fig. 6, for instance, but it is also a product-by-process limitation which does not affect the structure claimed, so even were it not met by *Kataoka* the claim would still be unpatentable; see MPEP 2113.]

8. Claims 1, 2, 4, 6, 7, 13, and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Ishitaka et al.,* U.S. Patent No. 5,725,915.

Ishitaka discloses [see Figs. 1 and 11, for instance] a liquid crystal display comprising upper and lower substrates with electrodes and grating films with surface undulations on each [col. 8, lines 9-57, for instance], and liquid crystal is sealed in the space between the substrates.

Ishitaka does not necessarily disclose that the liquid crystal has dielectric anisotropy; the examiner takes official notice that it is well known for the liquid crystal for such a device to have dielectric anisotropy; it would have been obvious to one of ordinary skill in the art at the time of the invention to have it so, motivated by the desire to produce a functioning LCD. Claim 1 is therefore unpatentable.

The grating film is on the electrode on top and bottom, so claims 2 and 4 are also unpatentable. The undulations are at 90° to each other [col. 28, lines 54-57], so claims 6 and 7 are also unpatentable. The surface undulation is formed using a photo-reactive

resin [col. 28, lines 40ff.], so claim 13 is also unpatentable. There are polarizers with perpendicular axes and a backlight [see Fig. 11], so claim 17 is also unpatentable.

9. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Ishitaka et al.,* U.S. Patent No. 5,725,915 as applied above, in view of *Yoneda et al.,* U.S. Patent No. 5,677,744.

Ishitaka discloses that the surface undulations in one dimension have a length "U" equal to 50 μm, for instance [col. 17, lines 56-58]. *Ishitaka* is silent on the size of the pixels in its device. *Yoneda* discloses that a typical pixel electrode is 50 μm by 50 μm [col. 9, line 20]; it would have been obvious to one of ordinary skill in the art at the time of the invention to use this pixel size, motivated by the desire to achieve a desired image resolution by having pixels of this size. In this case, the periods of the surface undulation and the pixel are the same, so claim 16 is unpatentable.

10. Claims 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Ishitaka et al.,* U.S. Patent No. 5,725,915 as applied above, in view of *Hirai et al.,* Japanese Patent Document No. 01-270024.

Ishitaka does not necessarily disclose compensation films. *Hirai* discloses [see Fig. 1], for an analogous LCD, compensation films [2 and 5] between the outer surfaces of the upper substrate and the lower substrate and the respective polarizers, wherein the optic axes of the compensation films are configured to form approximately 45° to the optic axes of the relevant polarizers [see abstract, Fig. 1]. It would have been obvious to one of ordinary skill in the art at the time of the invention to use such compensation films in the device of *Ishitaka*, motivated by the teaching of *Hirai* that this enables a high

contrast ratio even at wide viewing angles [see abstract], thereby producing an improved display. Claims 18 and 19 are therefore unpatentable.

[Note: a translation of this reference can be provided in the following office action if requested by the applicant.]

Election/Restrictions

11. Applicant's election without traverse of species A1, B1, C2, and D1 in the reply filed on 18 January 2005 is acknowledged.

Claims 3, 5, 10-12, and 20-22 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made without traverse in the reply filed on 18 January 2005.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (571) 272-2302. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Andrew Schechter
Patent Examiner
Technology Center 2800
31 March 2005